

CLAIMS

What is claimed is:

1. A network routing element for routing short message service (SMS) related signaling messages in a wireless communications network, the network element comprising;
  - (a) a first communications module for receiving, on an A-interface signaling link, messages from a base station controller (BSC);
  - (b) a discrimination application for determining whether the messages include a short message control protocol (SM-CP) component;
  - (c) an SMS off-load application for receiving messages from the discrimination application that include an SM-CP component and, in response, generating response messages using information extracted from the received messages; and
  - (d) a second communications module for encapsulating the response messages in data network packets and transmitting the network packets to a node in a data off-load network.
2. The network element of claim 1 wherein the first communications module is a signaling system 7 (SS7) link interface module.
3. The network element of claim 1 wherein the discrimination application is located on the first communications module.
4. The network element of claim 1 comprising a third communications module coupled to the first and second communications modules, wherein the discrimination application is located on the third communications module.

5. The network element of claim 1 wherein the SMS off-load application is adapted to determine the message type of a received SM-CP message.
6. The network element of claim 1 wherein the SMS off-load application is adapted to determine the message type of a short message relay protocol (SM-RP) component contained within a received SM-CP message.
7. The network element of claim 1 wherein the SMS off-load application is adapted to generate, using information extracted from a received SM-CP message packet, a second message including a mobile application part (MAP) component.
8. The network element of claim 7 wherein the MAP component includes a ForwardMOShortMessage signaling message.
9. The network element of claim 1 wherein the second communications module is an IP-capable data communication module (DCM) for transmitting the response messages over an IP off-load network.
10. The network element of claim 9 wherein the second communications module is adapted to encapsulate the response messages in a transport adapter layer interface (TALI) packets prior to transmitting over the IP network.
11. The network element of claim 1 wherein the discrimination application is adapted to determine whether the messages are related to mobile communication connection management services.
12. The network element of claim 1 wherein the SMS off-load application is adapted to perform connection management services.

13. The network element of claim 12 wherein the SMS off-load application is adapted to receive, process, and respond to connection management messages sent from the BSC.
14. The network element of claim 1 wherein the SMS off-load application is adapted to generate a response messages including an SM-CP message component.
15. The network element of claim 14 wherein the response messages are routed to the BSC via an A-interface signaling link.
16. The network element of claim 1 wherein the second communications module is adapted to transmit the response messages over a general packet radio services (GPRS) network.
17. A method for off-loading short message service (SMS) messages from a core mobile signaling network, the method comprising:
  - (a) receiving, on an A-interface signaling link, a first signaling message from a base station controller (BSC);
  - (b) determining whether the first signaling message includes a short message relay protocol (SM-RP) component;
  - (c) in response to determining that the first signaling message contains an SM-RP component, generating a second signaling message; and
  - (d) routing the second message towards a destination via an off-load network.
18. The method of claim 17 wherein the first message includes an SS7 signaling connection control part (SCCP) component.

19. The method of claim 17 wherein determining whether the first signaling message includes an SM-RP component includes determining whether the first signaling message contains an SM-RP-DATA message.
20. The method of claim 17 wherein generating a second message  
5 includes generating a MAP ForwardMOShortMessage message.
21. The method of claim 17 wherein generating a second message includes generating a MAP ReadyForShortMessage message.
22. The method of claim 17 wherein routing the second message towards a destination via an off-load network includes routing the second  
10 message towards the destination without involving a mobile switching center (MSC) coupled to the BSC via the A-interface.
23. The method of claim 17 wherein routing the second message towards a destination via an off-load network includes routing a MAP message towards the destination via an Internet protocol (IP) network.
24. The method of claim 17 wherein routing the second message towards  
15 a destination via an off-load network includes encapsulating the second message in a transport adapter layer interface (TALI) packet.
25. The method of claim 17 including determining whether the first signaling message includes a short message control protocol (SM-CP)  
20 component.
26. The method of claim 25 comprising, in response to determining that the first signaling message includes an SM-CP component, generating an SM-CP response message and routing the SM-CP response to the BSC.

27. The method of claim 17 including determining whether the first signaling message includes a connection management (CM) component.
28. The method of claim 27 comprising, in response to determining that the first signaling message includes an CM component, generating a CM response message and routing the CM response to the BSC.
29. The method of claim 17 wherein the off-load network is a general packet radio services (GPRS) network.
30. A method for reducing short message service (SMS) message routing resource requirements at a mobile switching center (MSC) in a wireless communications network, the method comprising;
  - (a) Intercepting, upstream from a mobile switching center, a first signaling message originated by a base station controller (BSC) in a wireless communication network;
  - (b) determining whether the first signaling message is a short message control protocol (SM-CP) DATA message;
  - (c) in response to determining that the first message is an SM-CP data message, terminating the SM-CP-DATA message and generating a second message; and
  - (d) routing the second message towards a destination via an off-load network such that the second message is delivered without involving the MSC.
31. The method of claim 30 wherein intercepting the first signaling message includes receiving the first signaling message on an A-interface signaling link.

32. The method of claim 30 wherein terminating the SM-CP-DATA message includes generating an SM-CP-ACK message and routing the SM-CP-ACK message to the originating BSC node.
33. The method of claim 30 wherein generating a second message includes generating a MAP ForwardMOShortMessage message.
34. The method of claim 30 wherein generating a second message includes generating a MAP ReadyForShortMessage message.
35. The method of claim 30 wherein routing the second message towards a destination via an off-load network includes encapsulating the MAP message in an Internet protocol (IP) packet.
36. The method of claim 30 wherein routing the second message towards a destination via an off-load network includes encapsulating the MAP message in one or more asynchronous transfer mode (ATM) cells.
37. The method of claim 30 including determining whether the first signaling message includes a connection management (CM) component.
38. The method of claim 37 where in response to determining that the first signaling message includes an CM component, generating a CM response message and routing the CM response message the originating BSC.
39. The method of claim 30 wherein the off-load network is a general packet radio services (GPRS) network.